

## CLAIMS

What is claimed is:

1. A method for recovering an erased voiced speech frame, the method comprising:
  - 5 obtaining a current input speech frame, said frame having a start-point and an endpoint;
  - reconstructing said current input speech frame from a previous input speech frame if said current input speech frame is lost;
  - creating a time-warped current input speech frame and a time-warped
  - 10 reconstructed frame from previous input speech frame by continuously time warping said current input speech frame and a copy of said previous input speech frame if said current input speech frame is correctly received and said previous input speech frame is reconstructed; and
  - fading simultaneously said time-warped current input speech frame and said
  - 15 time-warped reconstructed frame from previous input speech frame to obtain an improved current frame.
2. The method of claim 1, wherein said speech frame comprises speech
- 20 signal having zero or more pitch cycles.
3. The method of claim 2, wherein said continuously time warping said current input speech frame and said copy of said previous input speech frame comprises shifting one or more peaks of said pitch cycles of said current input speech frame and one or more peaks of said pitch cycles of said copy of previous input
- 25 speech frame to provide overlap of at least one of said one or more pitch cycles.

4. The method of claim 2, wherein said endpoint of said current input speech frame remains fixed during said time warping process.

5 5. The method of claim 1, wherein said reconstructing said current input speech frame from a previous input speech frame comprises copying said previous input speech frame as said current input speech frame.

6. The method of claim 1, wherein said fading simultaneously said  
10 time-warped current input speech frame and said time-warped reconstructed frame comprises:

fading in said time-warped current input speech frame; and

fading out said time-warped reconstructed frame of said copy of said previous input speech frame.

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7. The method of claim 1, wherein said fading is a linear fade operation.

8. An apparatus for recovering an erased voiced speech frame, the apparatus comprising:

20 a receiver for obtaining a current input speech frame, said frame having a start-point and an endpoint; and

a decoder for synthesizing speech from said input speech frame, said decoder synthesizing said input speech by:

25 reconstructing said current input speech frame from a previous input speech frame if said current input speech frame is lost;

creating a time-warped current input speech frame and a time-warped copy of previous input speech by continuously time warping said current input speech frame and a copy of said previous input speech if said current input speech frame is correct and said previous input speech frame is reconstructed;  
5 and

fading simultaneously said time-warped current input speech frame and said time-warped copy of previous input speech to obtain an improved current frame.

10 9. The apparatus of claim 8, wherein said speech frame comprises zero or more pitch cycles.

10. The apparatus of claim 9, wherein said continuously time warping said current input speech frame and said copy of said previous input speech comprises  
15 shifting one or more peaks of said pitch cycles of said current input speech frame and one or more peaks of said pitch cycles of said copy of previous input speech to provide overlap of at least one of said one or more pitch cycles.

11. The apparatus of claim 9, wherein said endpoint of said current input  
20 speech frame remains fixed during said time warping process.

12. The apparatus of claim 8, wherein said reconstructing said current input speech frame from a previous input speech frame comprises copying said previous input speech frame as said current input speech frame.

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13. The apparatus of claim 8, wherein said fading simultaneously said time-warped current input speech frame and said time-warped copy of previous input speech comprises:

5 fading in said time-warped current input speech frame; and  
fading out said time-warped copy of previous input speech.

14. The apparatus of claim 8, wherein said fading is a linear fade operation.

15. A computer program product comprising:  
10 a computer usable medium having computer readable program code embodied therein for recovering an erased voiced speech frame, said computer readable program code configured to cause a computer to:

obtain a current input speech frame, said frame having a start-point and an endpoint;

15 reconstruct said current input speech frame from a previous input speech frame if said current input speech frame is lost;

create a time-warped current input speech frame and a time-warped copy of previous input speech by continuously time warping said current input speech frame and a copy of said previous input speech frame if said current input speech frame is  
20 correct and said previous input speech frame is reconstructed; and

simultaneously fade said time-warped current input speech frame and said time-warped copy of previous input speech to obtain an improved current frame.

16. The computer program product of claim 15, wherein said speech frame  
25 comprises zero or more pitch cycles.

17. The computer program product of claim 16, wherein said continuously time warping said current input speech frame and said copy of said previous input speech frame comprises shifting one or more peaks of said pitch cycles of said current  
5 input speech frame and one or more peaks of said pitch cycles of said copy of previous input speech to provide overlap of at least one of said one or more pitch cycles.

18. The computer program product of claim 16, wherein said endpoint of  
10 said current input speech frame remains fixed during said time warping process.

19. The computer program product of claim 15, wherein said reconstruct said current input speech frame from a previous input speech frame comprises copying said previous input speech frame as said current input speech frame.  
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20. The computer program product of claim 15, wherein said simultaneously fade said time-warped current input speech frame and said time-warped copy of previous input speech comprises computer readable program code configured to cause a computer to:  
20 fade in said time-warped current input speech frame; and  
fade out said time-warped copy of previous input speech .

21. The computer program product of claim 15, wherein said fade is a linear operation.  
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